CLAIMS

1. In a wireless communication system, a method for utilizing a single Internet Protocol address for multiple Point-to-Point Protocol instances between a single wireless device and a wireless network, comprising:

establishing a first Point-to-Point Protocol link having an Internet Protocol Address;

establishing a second Point-to-Point Protocol link having the same Internet Protocol Address as the first Point-to-Point Protocol link; and

differentiating the endpoints of the first Point-to-Point Protocol link and the second Point-to-Point Protocol link using a link characteristic.

2. The method of claim 1 wherein the link characteristic is Quality of Service.

3. The method of claim 1 wherein the link characteristic is compression type.

4. The method of claim 1 wherein the link characteristic is encryption level.

5. The method of claim 1 wherein the link characteristic is Radio Link Protocol transmission delay.

6. The method of claim 1 wherein the link characteristic is guaranteed delivery level.

7. The method of claim 1 wherein the wireless device uses Simple Internet Protocol service.

8. The method of claim 1 wherein the wireless device uses Mobile Internet Protocol service.

9. In a wireless communication system, a method for differentiating Point-to-Point Protocol session termination endpoints within a wireless device that supports multiple Point-to-Point Protocol sessions associated with a single Internet Protocol Address, comprising:

establishing an initial Point-to-Point Protocol session between the wireless device and a wireless network node having an Internet Protocol address;

initiating a subsequent Point-to-Point Protocol session, between the wireless device and the wireless network node, using an Internet Protocol Control Protocol Configuration-Request message requesting the Internet Protocol Address of the initial Point-to-Point Protocol session in an Internet Protocol Address Configuration Option of the message, issued from the wireless device to the wireless network node;

searching for and finding, by the wireless network node, the initial Point-to-Point Protocol session with an Internet Protocol Address matching the requested Internet Protocol Address of the subsequent Point-to-Point Protocol session and a Mobile Station Identifier matching the Mobile Station Identifier of the wireless device;

concluding, by the wireless network node, that the subsequent Point-to-Point Protocol session is a multiple Point-to-Point Protocol session event;

accepting, by the wireless network node, the requested Internet Protocol address for the subsequent Point-to-Point Protocol session and acknowledging the acceptance in an Internet Protocol Control Protocol Configuration-Acknowledgement message returned to the wireless device having the requested Internet Protocol Address in the Internet Protocol Address Configuration Option of the Configuration-Acknowledgement message;

allowing, by the wireless network node, the exchange of data packets with the wireless device; and

differentiating the endpoints of the initial Point-to-Point Protocol session and the subsequent Point-to-Point Protocol session using a session link characteristic.

10. The method of claim 9 wherein the wireless network node is a Packet Data Service Node.

11. The method of claim 9 wherein the wireless network node is an Interworking Function.

12. The method of claim 9 wherein the link characteristic is Quality of Service.

13. The method of claim 9 wherein the link characteristic is compression type.

14. The method of claim 9 wherein the link characteristic is encryption level.

15. The method of claim 9 wherein the link characteristic is Radio Link Protocol transmission delay.

16. The method of claim 9 wherein the link characteristic is guaranteed delivery level.

17. The method of claim 9 wherein the wireless device uses Simple Internet Protocol service.

18. The method of claim 9 wherein the wireless device uses Mobile Internet Protocol service.

19. In a wireless communication system, a method for providing multiple grades of Radio Link Protocol service to an application of a wireless device, comprising:

establishing a Point-to-Point Protocol session for each grade of Radio Link Protocol service used by the application to create a set of Point-to-

Point Protocol sessions, where each Point-to-Point Protocol session belonging to the set has the same Internet Protocol address; and

differentiating the endpoint of each Point-to-Point Protocol session in the set using a session link characteristic.

20. The method of claim 19 wherein the link characteristic is Quality of Service.

21. The method of claim 19 wherein the link characteristic is compression type.

22. The method of claim 19 wherein the link characteristic is encryption level.

23. The method of claim 19 wherein the link characteristic is Radio Link Protocol transmission delay.

24. The method of claim 19 wherein the link characteristic is guaranteed delivery level.

25. The method of claim 19 wherein the wireless device uses Simple Internet Protocol service.

26. The method of claim 19 wherein the wireless device uses Mobile Internet Protocol service.

27. In a wireless communication system, a method for providing at least one grade of Radio Link Protocol service to a first application, and at least one grade of Radio Link Protocol service to at least a second application of a wireless device, comprising:

establishing at least one Point-to-Point Protocol session for the at least one grade of Radio Link Protocol service used by the first application, and establishing at least one Point-to-Point Protocol session for the at least one

grade of Radio Link Protocol service used by the at least second application, wherein each of the Point-to-Point Protocol sessions has the same Internet Protocol Address; and

differentiating the endpoint of each Point-to-Point Protocol sessions using a session link characteristic.

28. The method of claim 27 wherein the link characteristic is Quality of Service.

29. The method of claim 27 wherein the link characteristic is compression type.

30. The method of claim 27 wherein the link characteristic is encryption level.

31. The method of claim 27 wherein the link characteristic is Radio Link Protocol transmission delay.

32. The method of claim 27 wherein the link characteristic is guaranteed delivery level.

33. The method of claim 27 wherein the wireless device uses Simple Internet Protocol service.

34. The method of claim 27 wherein the wireless device uses Mobile Internet Protocol service.

35. A wireless communication system comprising:

a wireless device for supporting multiple Point-to-Point Protocol sessions having an identical Internet Protocol Address and different link characteristics; and

a wireless network node for exchanging data packets with the wireless device by differentiating the endpoint of each of the multiple Point-to-Point Protocol sessions using a session link characteristic.

36. The method of claim 35 wherein the wireless network node is a Packet Data Service Node.

37. The method of claim 35 wherein the wireless network node is an Interworking Function.

38. The method of claim 35 wherein the link characteristic is Quality of Service.

39. The method of claim 35 wherein the link characteristic is compression type.

40. The method of claim 35 wherein the link characteristic is encryption level.

41. The method of claim 35 wherein the link characteristic is Radio Link Protocol transmission delay.

42. The method of claim 35 wherein the link characteristic is guaranteed delivery level.

43. The method of claim 35 wherein the wireless device uses Simple Internet Protocol service.

44. The method of claim 35 wherein the wireless device uses Mobile Internet Protocol service.

45. A wireless device comprising a memory, wherein the memory embodies a method for supporting multiple Point-to-Point Protocol links having an identical Internet Protocol address, the method comprising:

establishing a first Point-to-Point Protocol link having an Internet Protocol Address;

establishing a second Point-to-Point Protocol link having the same Internet Protocol Address as the first Point-to-Point Protocol link; and

differentiating the endpoints of the first Point-to-Point Protocol link and the second Point-to-Point Protocol link using a link characteristic.

46. The wireless device of claim 45 wherein the link characteristic is Quality of Service.

47. The wireless device of claim 45 wherein the link characteristic is compression type.

48. The wireless device of claim 45 wherein the link characteristic is encryption level.

49. The wireless device of claim 45 wherein the link characteristic is Radio Link Protocol transmission delay.

50. The wireless device of claim 45 wherein the link characteristic is guaranteed delivery level.

51. The wireless device of claim 45 wherein the wireless device uses Simple Internet Protocol service.

52. The wireless device of claim 45 wherein the wireless device uses Mobile Internet Protocol service.

53. A wireless device comprising a memory, wherein the memory embodies a method for supporting multiple Point-to-Point Protocol links having an identical Internet Protocol address, the method comprising:

establishing an initial Point-to-Point Protocol session between the wireless device and a wireless network node having an Internet Protocol address; and

initiating a subsequent Point-to-Point Protocol session between the wireless device and the wireless network node, by using an Internet Protocol Control Protocol Configuration-Request message requesting the Internet Protocol Address of the initial Point-to-Point Protocol session in an Internet Protocol Address Configuration Option of the message, issued from the wireless device to the wireless network node.

54. The wireless device of claim 45 wherein the wireless device uses Simple Internet Protocol service.

55. The wireless device of claim 45 wherein the wireless device uses Mobile Internet Protocol service.

56. A wireless network node comprising a memory, wherein the memory embodies a method for supporting multiple Point-to-Point Protocol links having an identical Internet Protocol address, the method comprising:

establishing an initial Point-to-Point Protocol session with a wireless device having an Internet Protocol address;

establishing a subsequent Point-to-Point Protocol session with the wireless device in response to an Internet Protocol Control Protocol Configuration-Request message from the wireless device requesting the Internet Protocol Address of the initial Point-to-Point Protocol session in an Internet Protocol Address Configuration Option of the message;

searching for and finding the initial Point-to-Point Protocol session with an Internet Protocol Address matching the requested Internet Protocol Address of the subsequent Point-to-Point Protocol session and a Mobile Station Identifier matching the Mobile Station Identifier of the wireless device;

concluding that the subsequent Point-to-Point Protocol session is a multiple Point-to-Point Protocol session event;

accepting the requested Internet Protocol address for the subsequent Point-to-Point Protocol session and acknowledging the acceptance in an Internet Protocol Control Protocol Configuration-Acknowledgement message returned to the wireless device having the requested Internet Protocol Address in the Internet Protocol Address Configuration Option of the Configuration-Acknowledgement message;

allowing the exchange of data packets with the wireless device; and

differentiating the endpoints of the initial Point-to-Point Protocol session and the subsequent Point-to-Point Protocol session using a session link characteristic.

57. The wireless network node of claim 56 wherein the wireless network node is a Packet Data Service Node.

58. The wireless network node of claim 56 wherein the wireless network node is an Interworking Function.

59. The wireless network node of claim 56 wherein the link characteristic is Quality of Service.

60. The wireless network node of claim 56 wherein the link characteristic is compression type.

61. The wireless network node of claim 56 wherein the link characteristic is encryption level.

62. The wireless network node of claim 56 wherein the link characteristic is Radio Link Protocol transmission delay.

63. The wireless network node of claim 56 wherein the link characteristic is guaranteed delivery level.

64. The wireless network node of claim 56 wherein the wireless device uses Simple Internet Protocol service.

65. The wireless network node of claim 56 wherein the wireless device uses Mobile Internet Protocol service.

66. A wireless network node comprising a memory, wherein the memory embodies a method for supporting multiple Point-to-Point Protocol links having an identical Internet Protocol address, the method comprising:

establishing a first Point-to-Point Protocol link with a wireless device having an Internet Protocol Address;

establishing a second Point-to-Point Protocol link with a wireless device having the same Internet Protocol Address as the first Point-to-Point Protocol link; and

differentiating the endpoints of the first Point-to-Point Protocol link and the second Point-to-Point Protocol link within the wireless device using a link characteristic.

67. The wireless network node of claim 66 wherein the wireless network node is a Packet Data Service Node.

68. The wireless network node of claim 66 wherein the wireless network node is an Interworking Function.

69. The wireless network node of claim 66 wherein the link characteristic is Quality of Service.

70. The wireless network node of claim 66 wherein the link characteristic is compression type.

71. The wireless network node of claim 66 wherein the link characteristic is encryption level.

72. The wireless network node of claim 66 wherein the link characteristic is Radio Link Protocol transmission delay.

73. The wireless network node of claim 66 wherein the link characteristic is guaranteed delivery level.

74. The wireless network node of claim 66 wherein the wireless device uses Simple Internet Protocol service.

75. The wireless network node of claim 66 wherein the wireless device uses Mobile Internet Protocol service.

76. A wireless device comprising;

a wireless modem, a transmitter, and an antenna for establishing a wireless connection to a wireless network;

a control processor; and

a memory coupled to the control processor having code or instructions for directing the control processor to establish multiple Point-to-Point Protocol sessions having an identical Internet Protocol address and different link characteristics with the wireless network, and for differentiating endpoints of the Point-to-Point Protocol sessions using a session link characteristic.

77. The wireless device of claim 76 wherein the link characteristic is Quality of Service.

78. The wireless device of claim 76 wherein the link characteristic is compression type.

79. The wireless device of claim 76 wherein the link characteristic is encryption level.

80. The wireless device of claim 76 wherein the link characteristic is Radio Link Protocol transmission delay.

81. The wireless device of claim 76 wherein the link characteristic is guaranteed delivery level.

82. The wireless device of claim 76 wherein the wireless device uses Simple Internet Protocol service.

83. The wireless device of claim 76 wherein the wireless device uses Mobile Internet Protocol service.

84. A wireless network node comprising:

a control processor; and

a memory coupled to the control processor having program code or instructions for directing the control processor to access instructions in the memory to:

search for an existing Point-to-Point Protocol connection with a matching Internet Protocol address and Mobile Station Identifier in response to an Internet Protocol Control Protocol Configuration Request message from a wireless device requesting a succeeding Point-to-Point Protocol connection by specifying the known address of an initial connection in the Internet Protocol Address Configuration Option of the Configuration Request message;

match the Internet Protocol address and Mobile Station Identifier of the requested Point-to-Point Protocol connection to the Internet Protocol address and Mobile Station Identifier of the initial connection;

conclude that the requested connection is a multiple Point-to-Point Protocol connection event;

send a Configuration Acknowledgement message to the wireless device specifying the requested address in the Internet Protocol Address Configuration Option of the Configuration Acknowledgement message;

allow packet exchange with the wireless device; and

route Internet Protocol packets to different Point-to-Point Protocol connection endpoints within the wireless device having the same Internet Protocol address based on a characteristic of the connection.

85. The wireless network node of claim 84 wherein the wireless network node is a Packet Data Service Node.

86. The wireless network node of claim 84 wherein the wireless network node is an Interworking Function.

87. The wireless network node of claim 84 wherein the link characteristic is Quality of Service.

88. The wireless network node of claim 84 wherein the link characteristic is compression type.

89. The wireless network node of claim 84 wherein the link characteristic is encryption level.

90. The wireless network node of claim 84 wherein the link characteristic is Radio Link Protocol transmission delay.

91. The wireless network node of claim 84 wherein the link characteristic is guaranteed delivery level.

92. The wireless network node of claim 84 wherein the wireless device uses Simple Internet Protocol service.

93. The wireless network node of claim 84 wherein the wireless device uses Mobile Internet Protocol service.

94. A computer-readable medium having instructions stored thereon to cause computers in a communication system to perform a method for utilizing a single Internet Protocol address for multiple Point-to-Point Protocol instances between a single wireless device and a wireless network, the method comprising:

establishing a first Point-to-Point Protocol link having an Internet Protocol Address;

establishing a second Point-to-Point Protocol link having the same Internet Protocol Address as the first Point-to-Point Protocol link; and

differentiating the endpoints of the first Point-to-Point Protocol link and the second Point-to-Point Protocol link using a link characteristic.

95. The computer readable medium of claim 94 wherein the link characteristic is Quality of Service.

96. The computer readable medium of claim 94 wherein the link characteristic is compression type.

97. The computer readable medium of claim 94 wherein the link characteristic is encryption level.

98. The computer readable medium of claim 94 wherein the link characteristic is Radio Link Protocol transmission delay.

99. The computer readable medium of claim 94 wherein the link characteristic is guaranteed delivery level.

100. The computer readable medium of claim 94 wherein the wireless device uses Simple Internet Protocol service.

101. The computer readable medium of claim 94 wherein the wireless device uses Mobile Internet Protocol service.

102. A computer readable medium having instructions stored thereon to perform a method for differentiating Point-to-Point Protocol session termination endpoints within a wireless device that supports multiple Point-to-Point Protocol sessions associated with a single Internet Protocol Address, the method comprising:

establishing an initial Point-to-Point Protocol session between the wireless device and a wireless network node having an Internet Protocol address;

initiating a subsequent Point-to-Point Protocol session, between the wireless device and the wireless network node, using an Internet Protocol Control Protocol Configuration-Request message requesting the Internet Protocol Address of the initial Point-to-Point Protocol session in an IP Address Configuration Option of the message, issued from the wireless device to the wireless network node;

searching for and finding, by the wireless network node, the initial Point-to-Point Protocol session with an Internet Protocol Address matching the requested Internet Protocol Address of the subsequent Point-to-Point Protocol session and a Mobile Station Identifier matching the Mobile Station Identifier of the wireless device;

concluding, by the wireless network node, that the subsequent Point-to-Point Protocol session is a multiple Point-to-Point Protocol session event;

accepting, by the wireless network node, the requested Internet Protocol address for the subsequent Point-to-Point Protocol session and acknowledging the acceptance in an Internet Protocol Control Protocol Configuration-Acknowledgement message returned to the wireless device having the requested Internet Protocol Address in the Internet Protocol Address Configuration Option of the Configuration-Acknowledgement message;

allowing, by the wireless network node, the exchange of data packets with the wireless device; and

differentiating the endpoints of the initial Point-to-Point Protocol session and the subsequent Point-to-Point Protocol session using a session link characteristic.

103. The computer readable medium of claim 102 wherein the wireless network node is a Packet Data Service Node.

104. The computer readable medium of claim 102 wherein the wireless network node is an Interworking Function.

105. The computer readable medium of claim 102 wherein the link characteristic is Quality of Service.

106. The computer readable medium of claim 102 wherein the link characteristic is compression type.

107. The computer readable medium of claim 102 wherein the link characteristic is encryption level.

108. The computer readable medium of claim 102 wherein the link characteristic is Radio Link Protocol transmission delay.

109. The computer readable medium of claim 102 wherein the link characteristic is guaranteed delivery level.

110. The computer readable medium of claim 102 wherein the wireless device uses Simple Internet Protocol service.

111. The computer readable medium of claim 102 wherein the wireless device uses Mobile Internet Protocol service.

112. A computer readable medium having instruction stored thereon to casue computers in a wireless communication system to perform a method for

providing multiple grades of Radio Link Protocol service to an application of a wireless device, the method comprising:

establishing a Point-to-Point Protocol session for each grade of Radio Link Protocol service used by the application to create a set of Point-to-Point Protocol sessions, where each Point-to-Point Protocol session belonging to the set has the same Internet Protocol address; and

differentiating the endpoint of each Point-to-Point Protocol sessions in the set using a session link characteristic.

113. The computer readable medium of claim 112 wherein the link characteristic is Quality of Service.

114. The computer readable medium of claim 112 wherein the link characteristic is compression type.

115. The computer readable medium of claim 112 wherein the link characteristic is encryption level.

116. The computer readable medium of claim 112 wherein the link characteristic is Radio Link Protocol transmission delay.

117. The computer readable medium of claim 112 wherein the link characteristic is guaranteed delivery level.

118. The computer readable medium of claim 112 wherein the wireless device uses Simple Internet Protocol service.

119. The computer readable medium of claim 112 wherein the wireless device uses Mobile Internet Protocol service.

120. A computer readable medium having instructions stored thereon to cause computers n a wireless communication system to perform a method for providing at least one grade of Radio Link Protocol service to a first application,

and at least one grade of Radio Link Protocol service to at least a second application of a wireless device, the method comprising:

establishing at least one Point-to-Point Protocol session for the at least one grade of Radio Link Protocol service used by the first application, and establishing at least one Point-to-Point Protocol session for the at least one grade of Radio Link Protocol service used by the at least second application, wherein each of the Point-to-Point Protocol sessions has the same Internet Protocol Address; and

differentiating the endpoint of each Point-to-Point Protocol sessions using a session link characteristic.

121. The computer readable medium of claim 120 wherein the link characteristic is Quality of Service.

122. The computer readable medium of claim 120 wherein the link characteristic is compression type.

123. The computer readable medium of claim 120 wherein the link characteristic is encryption level.

124. The computer readable medium of claim 120 wherein the link characteristic is Radio Link Protocol transmission delay.

125. The computer readable medium of claim 120 wherein the link characteristic is guaranteed delivery level.

126. The computer readable medium of claim 120 wherein the wireless device uses Simple Internet Protocol service.

127. The computer readable medium of claim 120 wherein the wireless device uses Mobile Internet Protocol service.